The C&D Debris Lifecycle: Reuse/Recycling Optimization

NDIA Environmental & Energy Symposium
April 8, 2004

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Acknowledgements

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C&D Debris Life Cycle: Reuse/Recycling Optimization

Objective

To evaluate the theories and realities of the C&D debris life cycle and how reuse/recycling can be optimized.

This activity was performed as part of a Congressionally-funded task under NDCEE.

Project Partnership

- US Army Corps of Engineers, Construction Engineering Research Laboratory (CERL)
- National Defense Center for Environmental Excellence (NDCEE)
- USDA Forest Products Laboratory
- Pennsylvania State University
- University of Florida
- USA Recovered Resources
- Fort Ord Reuse Authority

Fort Ord, Monterey, CA

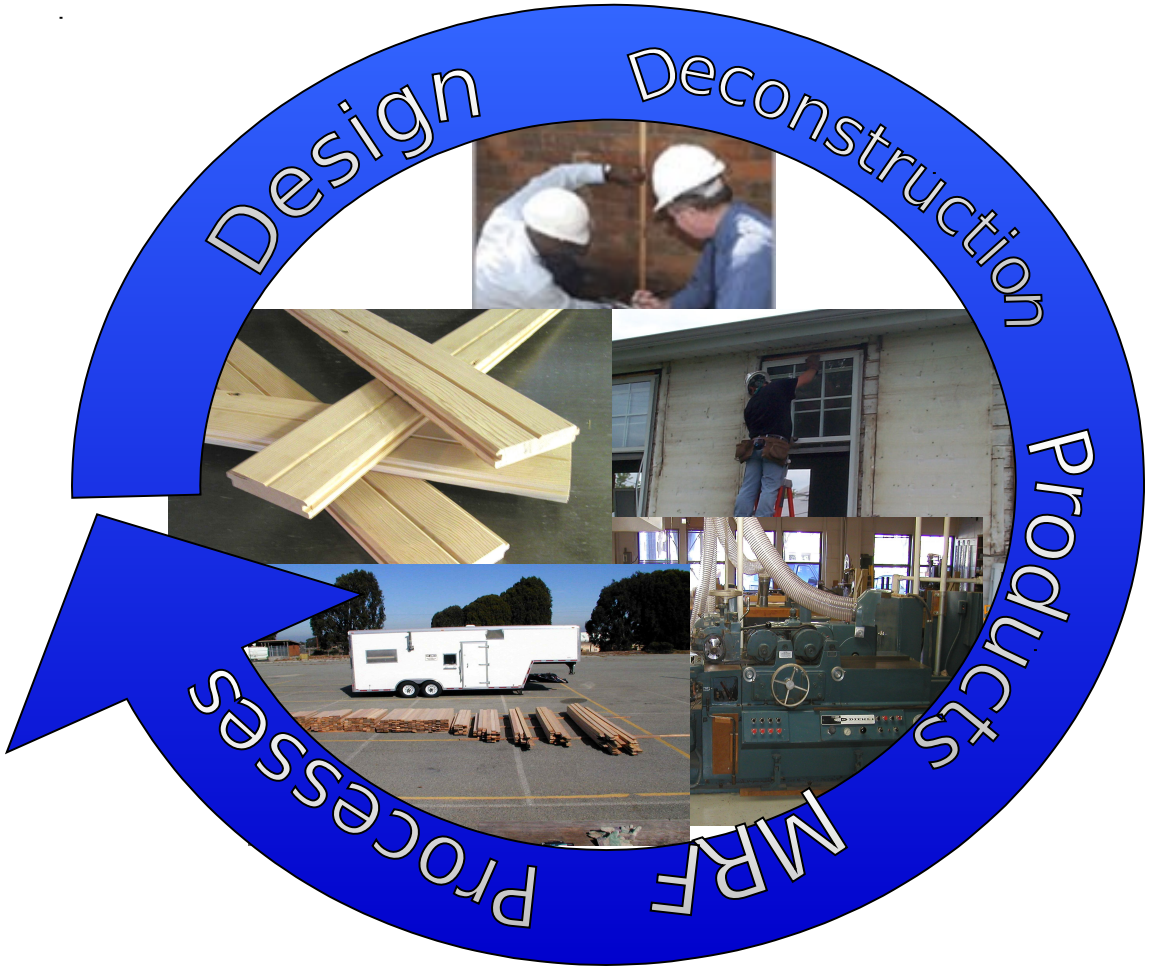
The Magnitude of the problem for DoD!

C&D Debris Life Cycle: Reuse/Recycling Optimization

Introduction

- Waste is not inevitable!
- Approx. 136M tons of C&D debris waste generated per year according to USEPA
- Only 20-30% of this waste is currently recycled for reuse.
- Recycling is important, but reuse is critical.

C&D Debris Life Cycle: Reuse/Recycling Optimization



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Design for Reuse

- "Work with what you have"
- Kit-of-parts strategy
- Opportunistic and systematic reuse
- Appearance of reuse: "New" versus "Used"
- Design for Reuse (DfR)

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Deconstruction

- The disassembly of buildings which safely and efficiently maximizes the reuse and recycling of the materials.
- An immature but growing industry
- Currently being extensively promoted throughout DoD

Deconstruction at Fort Campbell, KY

Deconstruction at Fort Campbell, KY

Deconstruction at Fort Ord, CA

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Reuse/Recycling Opportunities

- Materials currently being reused/recycled:
  - Wood
  - Concrete
  - Asphalt
  - Roofing shingles
- Other materials gaining interest are carpeting and gypsum wallboard.

Concrete Recycling at Fort Campbell, KY

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MRF Implementation

- The concept of a Material Recycling Center (MRF) is not new.
- What is new is placing a MRF onsite where extensive deconstruction is occurring.
  - Wood, concrete, and asphalt are the best applications currently.
- Currently being evaluated at Fort Ord, CA

Mobile Processing Unit

Processed Wood

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Value-Added Products

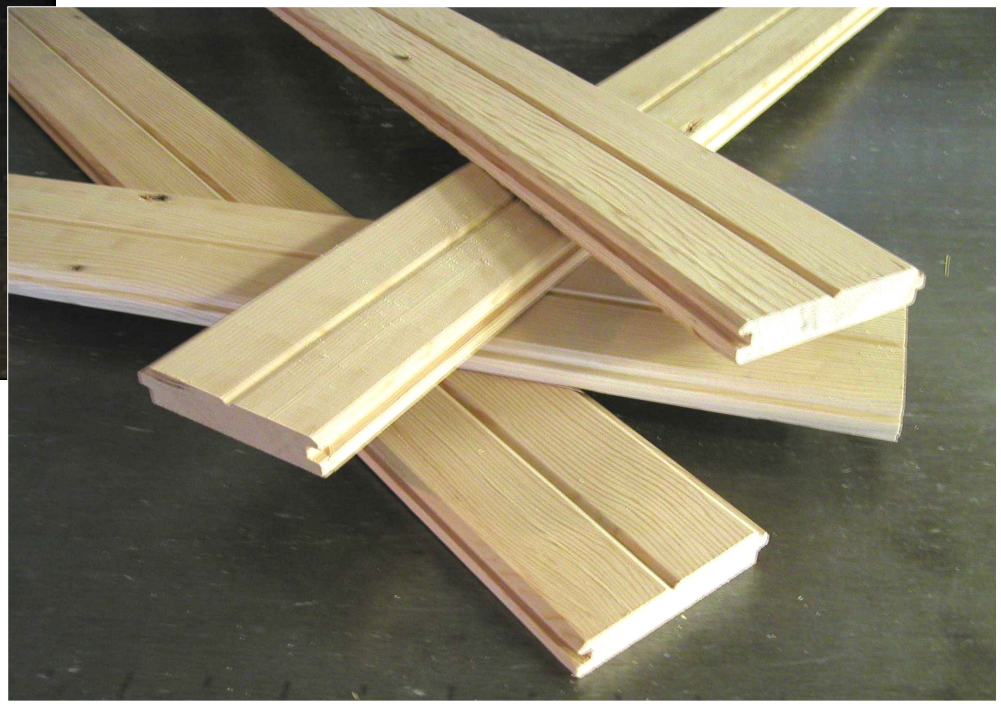
- Examples of products currently being developed:
  - Crushed concrete recycled as roadbed
  - Exterior wood siding reused as interior flooring and paneling
- Markets for these products are evolving.
  - Habitat for Humanity has “ReStores” for selling recycled products.

Finished Wood Products Made from Fort Ord Siding

Tongue and Groove Flooring

Finished Wood Products (Continued)

Beveled Wood Siding



V-Groove Paneling

Value of Flooring from Siding

- Antique T&G Flooring (Nominal 3" Width)
  - Typical Pricing: $3 to $11 per square foot (sf) [4 Linear Feet Equals 1 sf]
  - Higher Value for Vertical Grain
  - Higher Value for Nail Holes
- Retail Value From Each Building at Least $2500 (Based on $4 sf)

Conclusions

- The optimal solution for reuse/recycling is to consider it closed-loop.
  - Design the resultant value-added products into new or renovated structures.
- Remove stigma that these products are inferior or sub-standard
- Ultimate benefits include reduced costs, landfill diversion, and resource conservation.

Conclusions (Continued)

- Not all installations have the same quality of wood siding; therefore, economic evaluation will be necessary on a project location basis.
- High-value wood products can be produced from high-quality wood siding, which has been found readily available.